Department of Toxic Substances Control

Preventing environmental damage from hazardous waste, and restoring contaminated sites for all Californians.

State of California

California Environmental Protection Agency

Fact Sheet, July 2006

DTSC's Perchlorate Best Management Practices (BMPs)

INTRODUCTION

The California Legislature passed the Perchlorate Contamination Prevention Act of 2003 requiring the Department of Toxic Substances Control (DTSC) to adopt best management practices regulations for perchlorate materials. DTSC adopted the Perchlorate Best Management Practices (BMP) regulations on December 31, 2005, and the regulations are effective July 1, 2006.

If you are in the Department of Defense, or you are in an industry centered on aerospace, fireworks, pyrotechnics, amusement parks, automobile air bag and safety restraint, lithium perchlorate batteries, or if you are in a public safety agency, this information is of use to you. Others affected by these regulations include farmers who use perchlorate-containing fertilizer, laboratories, bleach manufacturers and users, and Publicly Owned Treatment Works (POTWs). Even households may be affected.

This fact sheet provides some background information to help understand the requirement of the new regulations. This fact sheet also lists the types of perchlorate-containing products that may be subject to these requirements and describes the perchlorate best management practices.

Why regulate perchlorate?

There are existing hazardous material regulations for perchlorate in its pure form because it is a strong oxidizer that can explode. It can also change very violently and is flammable. In recent years, environmental agencies have found more and more instances of perchlorate appearing in increasing levels in drinking water, groundwater, surface water and soil. In light of the risks to public health and the environment posed by perchlorate releases, the California Legislature directed DTSC to establish best management practices for the prevention of perchlorate contamination. DTSC wrote regulations establishing standards for handling materials, products, and waste that contain perchlorate.

What is perchlorate?

Perchlorate is a chemical that is both manufactured and naturally-occurring. Most commonly found as an ionic salt, when dissolved in water it easily moves through and travels with the flow of water on or beneath the ground. Ammonium perchlorate and sodium perchlorate are examples of manufactured salts. Environmental agencies

attribute its presence in the environment to past waste handling practices at facilities that manufacture or use this perchlorate and materials containing the chemical.

How is perchlorate used?

Perchlorate is used primarily as an ingredient in solid rocket propellant. The Department of Defense, the National Aeronautics and Space Administration (NASA), and the defense industry use, and have for decades used, perchlorate in manufacturing, testing, and firing rockets and missiles. On the basis of 1998 manufacturer data, U.S. EPA estimated that manufacturing demand for the military and NASA is 90 percent of the perchlorate salt produced in the United States.

Private industry has used perchlorate to manufacture products such as fireworks, flares, automobile airbags, coin-cell batteries, and commercial explosives. Perchlorate is also found as an impurity in manufactured chemicals and products. Perchlorate can also occur as an impurity in some natural mineral formations such as Chilean nitrate, used in some fertilizers.

How do I know if I am using products that contain perchlorate?

You can find perchlorate in a variety of materials. The new perchlorate regulations require that those who manufacture products, or who bring products into California for distribution, label those products to inform consumers of the perchlorate content. The information may appear on the product itself, on the product label, in a Material Safety Data Sheet, or a product insert.

In what products can I expect to find perchlorate?

Solid Rocket Motors: The amount of ammonium perchlorate required in a given motor varies by the type of solid rocket or missile propellant. For example, model rockets are fueled by single-use rocket motors may contain perchlorate. These motors are professionally manufactured and available to the general public for purchase.

Flares: Both road and marine flares contain perchlorate salts.

Fireworks: Sodium perchlorate and potassium perchlorate are often ingredients in fireworks.

Pyrotechnic Devices: Pyrotechnics, used to produce light, smoke, heat, or sound effects, all contain an oxidizer component that is often a perchlorate material.

Explosives: Perchlorate salts have been used as detonators, initiators, and propellants in military explosives. A newer class of explosives now includes ammonium perchlorate in the formulations to reduce accidental ignitions due to shock.

Blasting Agents: Some blasting agents, mostly water gels, and emulsions, can contain substantial amounts of perchlorate salts. Perchlorate-containing blasting agents are especially useful in construction and mining when conditions are wet or water-saturated.

Common Batteries: These include small button batteries which are the size and shape of coins. The battery numbers will start with "CR" and they may be found in watches, appliances, keyless entry systems, and any device that is able to retain memory after the power supply is cut off.

Air Bag Initiators: Airbag initiators are part of a car's safety system and they may contain perchlorate. If the air bag is deployed during an accident, the perchlorate is used up in the process.

Bleach: Hypochlorite solutions may contain perchlorate as an impurity. The concentration may increase as the product ages.

Fertilizers: Chilean (sodium) nitrate is a mined source of highly soluble nitrogen and is used in fertilizer products. Other names for this nitrate are Bulldog Soda, nitrate of soda, Chilean saltpeter, soda niter, and nitric acid sodium salt.

What are the human health effects of perchlorate?

Perchlorate disrupts the function of the thyroid gland by interfering with the iodide uptake and thyroid hormone production. This interference can lead to developmental defects. Scientists consider pregnant women, children, infants, and individuals with thyroid disorders to be the populations most at risk of harm from being exposed to perchlorate. These health threats are the reason agencies set standards for perchlorate.

What are California Public Health Goals, and Maximum Contaminant Levels?

Simply stated, a Public Health Goal is the level of a contaminant in drinking water below which scientists conclude that there is no known or expected risk to health. Although they are "goals," and not regulations, environmental agencies consider these goals when making decisions. In March 2004, the California Office of Environmental Health Hazard Assessment published a Public Health Goal of 6 parts-per-billion (ppb, roughly six micrograms per liter) for perchlorate in drinking water, based on its calculations of the potential for harmful exposure.

Maximum Contaminant Levels (MCLs) are enforceable standards setting the maximum permissible level of a contaminant in water delivered to any user of a public system. The California Department of Health Services sets MCLs as close to Public Health Goals as is technologically and economically feasible. That department is in the is in the process of establishing a drinking water standard for perchlorate and, until completing that project, set the "notification level" at the 6 ppb level. That means water suppliers have to tell their customers if the water tests above that level.

What is 6 ppb?

Parts-per-billion are units of measure that scientists use to describe the concentration of a contaminant found within a large volume of another substance such as water. A way to visualize 1 part per billion (ppb) is to think of one-half of a teaspoon of salt in an Olympic-sized swimming pool.

How can I determine the concentration of perchlorate?

You may use industry or chemical knowledge, or a Material Safety Data Sheet, to determine if the perchlorate material has a perchlorate concentration above the 6 ppb level. A Material Safety Data Sheet is a detailed informational document of a hazardous material. If the material already has a perchlorate label, you can assume that the material contains perchlorate above the 6 ppb concentration level.

You can also determine the concentration by using various analytical methods. To comply with the Safe Drinking Water Act standards, a lab must use EPA Method 314.0 - Determination of Perchlorate in Drinking Water by Ion Chromatography. U.S EPA and others are developing additional analytical methods. As examples, EPA's Office of Solid Waste is working on a Method 6850 for analyzing perchlorate in various wastes; and the U.S. Food and Drug Administration published a draft analytical method for perchlorate in water, milk, and lettuce.

What are the Perchlorate Best Management Practices?

DTSC established perchlorate best management practices in regulations to address various aspects of handling perchlorate-containing material to minimize the threat of release and resulting public health or environmental harm. Key requirements of these regulations include:

Labeling

- Businesses need to inform purchasers of perchlorate materials or products about the item's perchlorate content.
- Businesses that manufacture perchlorate materials, repackage perchlorate materials, distribute perchlorate materials for sale, receive perchlorate materials for resale or use in California, or who generate a perchlorate-containing waste need to ensure that these perchlorate materials are properly labeled or marked with the following, "Perchlorate Material – special handling may apply."

Packaging

- Businesses that manufacture, package and distribute perchlorate materials must ensure they are properly contained in water-resistant packaging and labeled.

Containment

- Businesses must adopt additional containment procedures when materials or products are not contained in durable, water-resistant containers. For example, during manufacturing or repackaging, there may be times when perchlorate containing material is not in a container – transferring from one container to another, for example - so that activity needs to be occur in weather-resistant structures on floors that do not contain drains.

One-Time Notification

- Businesses managing more than 500 pounds of solid perchlorate material or 55 gallons of liquid perchlorate material must submit to DTSC a one-time notification about their perchlorate materials and related activities. Send that notification to DTSC on or before September 1, 2007, to cover activities occurring between July 1, 2006 and June 30, 2007. This is in addition to the required hazardous material business plan.

Special Practices

- Use road safety flares in a way to minimize release of perchlorate into the environment. Businesses that use road flares should limit the duration and number of flares used for each emergency use.
- All personnel who routinely use road flares in the normal course of employment should receive instruction on the potential environmental hazards associated with using perchlorate materials and on the perchlorate best management practice requirements.
- Use marine safety flares in a manner that minimizes releases of perchlorate to the environment. Do not throw them into the water or into normal garbage. You cannot burn flares to dispose of them.
- Collect un-ignited pyrotechnics within 24 hours of a fireworks display and manage them as hazardous waste.

Spill Response

- Businesses are responsible for cleaning up any spills of perchlorate-containing materials. You must first contain the spill, then clean it up to prevent the chemical from going into storm drains.

Discharge and Disposal

- Businesses can only dispose perchlorate-containing solid material to either a hazardous waste landfill or a composite-lined portion of a non-hazardous waste landfill.
- Landfills and Publicly Owned Treatment Works (POTWs, wastewater treatment facilities owned by a state or municipality) that accept non-hazardous perchlorate wastes must notify the appropriate Regional Water Quality Control Board of any perchlorate discharge and comply with any modifications to existing environmental monitoring programs.
- Businesses that discharge non-hazardous liquid perchlorate-containing waste or wastewater must notify the overseeing regulatory agency of the discharge. Typically, this is the POTW having jurisdiction in their area, and the business must notify the local Regional Water Quality Control Board. This allows regulatory agencies the opportunity to evaluate these discharges and determine whether the business should include perchlorate in its monitoring program.

Pollution Prevention

- On or before January 1, 2008, and every five years thereafter, a business that uses perchlorate-containing fertilizers, safety flares, explosives, or blasting agents, in an amount greater than 500 pounds at any given time (the same "trigger" used in the Business plan) must review the use of these products determine for themselves if a non-perchlorate-containing alternative is available. These businesses also need to review and implement as appropriate pollution prevention measures to prevent releases of perchlorate.

- On or before January 1, 2008, and every five years thereafter, a business using more than 4,000 pounds of fireworks or 8,000 pounds of solid rocket motors at any given time must submit to DTSC any existing environmental monitoring for perchlorate in the soil or water around the area of use.

When do the perchlorate BMPs apply?

Perchlorate materials include all forms of matter, goods, products, or waste that contain perchlorate. The perchlorate best management practices regulation specifically excludes hazardous waste, materials with perchlorate concentrations below 6 ppb, food, crops, irrigation water, combustion residuals, and contaminated media.

The regulations apply to any person or business that manages perchlorate materials or waste in any manner including use, processing, generation, transportation, storage, and disposal.

Perchlorate for Households

Households are subject to these regulations but have the following minimal requirements.

- Households need to maintain proper packaging. The best way to do that is to keep perchlorate-containing materials in the original containers.
- If you keep the materials in durable, waterproof packaging, you do not have to have a second or backup way to contain it.
- If you use safety flares, keep the duration and number of flares to what is necessary for the emergency.
- If you use marine safety flares, do not throw them in the water or in the normal garbage. You cannot burn them as a way to dispose of them. Contact your local household hazardous waste center for directions on management.
- Any spills of perchlorate products, spent fireworks, spent road flares, or spent model rockets need to be collected and may be disposed in the garbage.

For all other businesses, the requirements depend on how the business uses or manages perchlorate materials and/or waste. The following highlight requirements for businesses that sell perchlorate-containing products or handle pyrotechnics, safety flares, solid rocket motors, or fertilizers:

Perchlorate BMPs for Retailers

- Retailers who distribute perchlorate containing materials for sale, resale or use in California are responsible to ensure that products are properly labeled or marked with the following, “Perchlorate Material – special handling may apply.”
- Retailers need to ensure that perchlorate-containing products are in packaging or containers that are durable and water-resistant.

Perchlorate BMPs for Special Event Organizers or Amusement Parks using Fireworks

- Pyrotechnics operators are responsible for collecting any “stars” and un-ignited pyrotechnic material found during the inspection of the firing range after a public display of fireworks. The collected material must be managed as hazardous waste.
- On or before January 1, 2008, a business that uses fireworks in amounts greater than 4,000 pounds at any given time needs to submit to DTSC any existing environmental monitoring for perchlorate in the soil and/or water around the area of firework use.

Perchlorate BMPs for Law Enforcement, Fire Response and Other Governmental Agencies using Safety Flares

- Agencies that use safety flares should limit the duration and number of flares used for the emergency.
- All personnel who routinely use flares in the normal course of employment should receive instruction on the potential environmental hazards associated with the use of perchlorate materials and on the perchlorate BMP requirements.

- On or before January 1, 2008, and every five years thereafter, an agency that uses perchlorate-containing safety flares in an amount greater than 500 pounds in any month, needs to review the use of these perchlorate-containing products and determine for itself if a non-perchlorate-containing alternative is available. Agencies must review and implement as appropriate pollution prevention measures to prevent releases of perchlorate.

Perchlorate BMPs for Businesses Producing, Testing, or Developing Solid Rocket Motors

- Businesses that process, manufacture, or store perchlorate materials, such as solid rocket motors, must contain these materials in a weather-resistant structure without drains and that prevent seepage into or out of the containment area.
- On or before January 1, 2008 and every five years thereafter, a business using solid rocket motors in amounts greater than 8,000 pounds at any given time must submit to DTSC any existing environmental monitoring for perchlorate in the soil and/or water around the area of use.

Perchlorate BMPs for Businesses Using Fertilizer Derived from Chilean Nitrate

- Businesses that manufacture, package, or distribute this fertilizer must ensure that products are properly labeled or marked with the following, "Perchlorate Material – special handling may apply."
- Businesses that simply use this fertilizer are exempt from labeling.
- Businesses that handle or sell these fertilizers need to ensure that these products are in durable and water-resistant packaging or containers.
- Businesses that apply the fertilizer are exempt from the containment requirement, if the fertilizer is stored for less than 30 days on the site of intended application.
- If the distributor from which you got it reported the fertilizer as required by the California's Food and Agriculture annual tonnage report on fertilizer sales and distribution, the business using it need not make the one-time notification described elsewhere.
- Businesses that solely use fertilizers allowed by the U.S. Department of Food and Agriculture in keeping with the Organic Foods Production Act of 1990 are exempt from pollution prevention requirements.

Where can I get more information about perchlorate?

General

DTSC has a two perchlorate pages on its website. The first page includes general information, fact sheets, and links to other online resources and is at www.dtsc.ca.gov/HazardousWaste/Perchlorate /index.cfm. The second page, found at www.dtsc.ca. gov/LawslegsPolicies/Regs/Perchlorate_regs.cfm includes the regulations and all the background documents that were developed in support of the perchlorate BMPs.

Health

The California Department of Health Services maintains a web page that provides an overview of issues regarding perchlorate in drinking water at http://www.dhs.ca.gov/ps/ddwem/chemicals/perchl/perchlindex.htm.

For additional information on the health effects of perchlorate, DTSC suggests you search Office of Environmental Health Hazard Assessment site at http://www.oehha.org. You will find the Final Technical Support Document for the Public Health Goal for Perchlorate in Drinking Water is located at www.oehha.org/water/phg/pdf/perchlorate3docs.pdf

You can also find health information on the Centers for Disease Control's Agency for Toxic Substances and Disease Registry at http://www.atsdr.cdc.gov/tfacts162.html

Occurrence
The State Water Resources Control Board, in co-ordination with DTSC, has different reports on perchlorate occurrence.

U.S. EPA has national occurrence maps available at: www.epa.gov/swerffrr/documents/perchlorate_links.htm#occurrences.

Analytical Methods
DTSC's Testing Guidance at www.dtsc.ca.gov/HazardousWaste/Perchlorate/upload/HML_POL_Guidance_Perchlorate-Testing.pdf.

U.S. EPA guidance at:

www.epa.gov/safewater/methods/sourcalt.html, and www.epa.gov/ncea/perchlorate/references/documents/ref006.pdf.

Disclaimer

This fact sheet was prepared in July 2006 and is based on statutes and regulations in effect at that time. The reader should not rely solely on this fact sheet for regulatory compliance and should instead review the most current statutes and regulations.

Acronyms

BMP	Best Management Practice
Cal/EPA	California Environmental Protection Agency
DTSC	Department of Toxic Substances Control
MCL	Maximum Contaminant Levels
PHG	Public Health Goal
ppb	Parts per billion
US EPA	United States Environmental Protection Agency

Glossary

"***Managing perchlorate materials***" means generation, storage, transportation, manufacture, processing, fabrication, packaging, use, reuse, treatment, transfer, pumping, recovery, recycling, spill response, disposal, and discharge.

"***Packaging***" means a receptacle and any other components or materials necessary for the receptacle to perform its containment function in conformance with the minimum packing requirements.

"***Perchlorate material***" means all perchlorate-containing materials including perchloric acid and perchlorate compounds. "Perchlorate material" includes all forms of matter, goods, and products.

For More Information or Assistance

For assistance or information call DTSC's Regulatory Assistance toll free at 1 800-72 TOXIC (1-800-728-6942) or visit our website at www.dtsc.ca.gov.

The actual text of the Perchlorate BMP regulations is available at www.dtsc.ca.gov/HazardousWaste/Perchlorate/index.cfm.